



# FCC PART 15C TEST REPORT No.I22Z60417-IOT05

for

**Wingtech Group (Hong Kong) Limited**

**5G Mobile Phone**

**TMAF025G**

With

**FCC ID: 2APXW-TMAF025G**

**Hardware Version: V2.0**

**Software Version: TMAF025G\_0.01.01**

**Issued Date: 2022-05-14**

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## **REPORT HISTORY**

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I22Z60417-IOT05	Rev.0	1st edition	2022-05-14

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## 1. TEST LABORATORY

### 1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

### 1.2. Testing Location

Testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,  
P. R. China100191

### 1.3. Testing Environment

Normal Temperature: 15-35°C

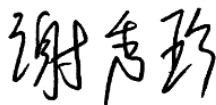
Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2022-03-10

Testing End Date: 2022-05-14

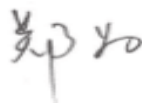
### 1.5. Signature



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Xie Xiuzhen

( Prepared this test report )



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Zheng Wei

(Reviewed this test report)



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Hu Xiaoyu

(Approved this test report)



## **2. CLIENT INFORMATION**

### **2.1. Applicant Information**

Company Name: Wingtech Group (Hong Kong) Limited  
Address: Flat/RM 1802 18/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui, KL,  
HK  
City: HK  
Postal Code: /  
Country: China  
Telephone: +86-21-53529900  
Fax: /

### **2.2. Manufacturer Information**

Company Name: Wingtech Group (Hong Kong) Limited  
Address: Flat/RM 1802 18/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui, KL,  
HK  
City: HK  
Postal Code: /  
Country: China  
Telephone: +86-21-53529900  
Fax: /

### 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY

#### EQUIPMENT(AE)

##### 3.1. About EUT

Description	5G Mobile Phone
Model name	TMAF025G
FCC ID	2APXW-TMAF025G
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.85V

##### 3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
UT92a	861690060017957	V2.0	TMAF025G_0.01.01
UT07a	861690060005747	V2.0	TMAF025G_0.01.01

\*EUT ID: is used to identify the test sample in the lab internally.  
 UT07a is used for conduction test, UT92a is used for radiation test.

##### 3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB Cable	/	/

###### AE1

Model	RE001
Manufacturer	SUNWODA ELECTRONIC CO., LTD
Capacity	4500mAh
Nominal Voltage	

###### AE2

Model	BLJ-QC06HU
Manufacturer	Zhongshan Baolijin Electronic Co., Ltd
Length of cable	/

###### AE3

Model	USB AM TO TYPE-C2.0
Manufacturer	SUNTOPS ELECTRONICS CO.,LTD
Length of cable	/

\*AE ID: is used to identify the test sample in the lab internally.

##### 3.4. General Description

Equipment Under Test (EUT) is a model of 5G Mobile Phone with integrated antenna. It consists of normal options: Battery and Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the Client.

## 4. REFERENCE DOCUMENTS

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

FCC Part15	FCC CFR 47, Part 15, Subpart C and E: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.407 General technical requirements	2018
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033 D02	General U-NII Test Procedures New Rules v02r01	2017-12

## 5. LABORATORY ENVIRONMENT

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

## 6. SUMMARY OF TEST RESULTS

### 6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.407 (a)	/	P
Peak Power Spectral Density	15.407 (a)	/	P
Occupied 6dB Bandwidth	15.407 (e)	/	P
Band Edges Compliance - Conducted& Radiated	15.407 (b)	/	P
Transmitter Spurious Emission - Conducted	15.407	/	P
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NM	Not measured, The test was not measured by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard



## 6.2. Statements

CTTL has evaluated the test cases requested by the client/manufacture as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.1.

This report only deals with the WLAN function among the features described in section 3.

## 6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26°C
Voltage	3.85V
Humidity	44%

## 7. TEST EQUIPMENTS UTILIZED

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2022-05-24
2	Test Receiver	ESCI 7	100344	R&S	1 year	2023-03-21
3	LISN	ENV216	101200	R&S	1 year	2022-05-30
4	Shielding Room	S81	/	ETS-Lindgren	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103023	R&S	1 year	2022-10-28
2	EMI Antenna	VULB 9163	302	SCHWARZBECK	1 year	2022-12-28
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2022-07-01

※The Test Receiver with series number of 100344 is within the calibration period when used.

## 8. Measurement Uncertainty

### 8.1. Transmitter Output Power

Measurement Uncertainty: 0.387dB,k=1.96

### 8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

### 8.3. Occupied 6dB Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

### 8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

### 8.5. Spurious Emissions

#### Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

#### Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.16
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.44
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.28

### 8.6. AC Power-line Conducted Emission

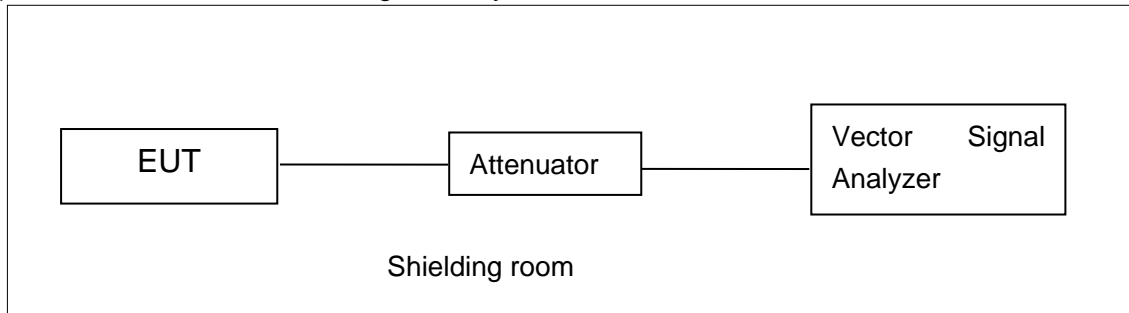
Measurement Uncertainty : 3.08dB,k=2

## ANNEX A: MEASUREMENT RESULTS

### A.1. Measurement Method

#### A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer

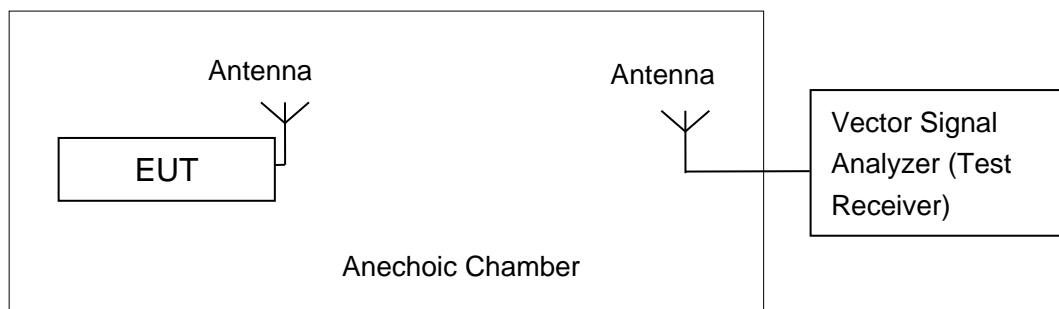


#### A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

## A.2. Maximum Peak Output Power

### Measurement Limit and Method:

Standard	Limit (dBm)
FCC CRF Part 15.407(a)	< 30

### A.2.1 Antenna Gain

Antenna gain is -0.1dBi and the value is supplied by the applicant or manufacturer.

### A.2.2. Maximum Average Output Power-Conducted

#### Measurement Results:

#### 802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	19.88	19.58	19.10

The data rate 6Mbps is selected as worse condition, and the following cases are performed with this condition.

#### 802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n(20MHz)	MCS0	19.89	19.37	19.22

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

#### 802.11ac-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ac(20MHz)	MCS0	18.42	18.16	17.68

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

**802.11n-HT40 mode**

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11n(40MHz)	MCS0	18.12	17.83

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

**802.11ac-HT40 mode**

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ac(40MHz)	MCS0	17.12	16.94

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

**802.11ac-HT80 mode**

Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ac(80MHz)	MCS0	16.22

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

The duty cycle of all mode are 100%.

**Conclusion: PASS**

### A.3. Peak Power Spectral Density

#### Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407(a)	< 30 dBm/500 kHz

The measurement is made according to ANSI C63.10 and KDB789033 D02

#### Measurement Uncertainty:

Measurement Uncertainty	0.75dB
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#### Measurement Results:

Mode	Channel	Power Spectral Density ( dBm/500kHz )	Conclusion
802.11a	149	6.32	P
	157	5.76	P
	165	5.55	P
802.11n HT20	149	6.29	P
	157	5.59	P
	165	5.37	P
802.11n HT40	151	1.62	P
	159	1.09	P
802.11ac HT80	155	-3.94	P

**Conclusion: PASS**

### A.4. Occupied 6dB Bandwidth

#### Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.407 (e)	≥ 500

The measurement is made according to KDB789033 D02 .

#### Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
-------------------------	---------

#### Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth ( MHz)		conclusion
802.11a	149	Fig.1	16.35	P
	157	Fig.2	16.30	P
	165	Fig.3	16.30	P
802.11n HT20	149	Fig.4	17.60	P
	157	Fig.5	17.55	P
	165	Fig.6	17.60	P
802.11n HT40	151	Fig.7	36.00	P
	159	Fig.8	36.32	P
802.11ac HT80	155	Fig.9	76.16	P

#### Conclusion: PASS

#### Test graphs as below:

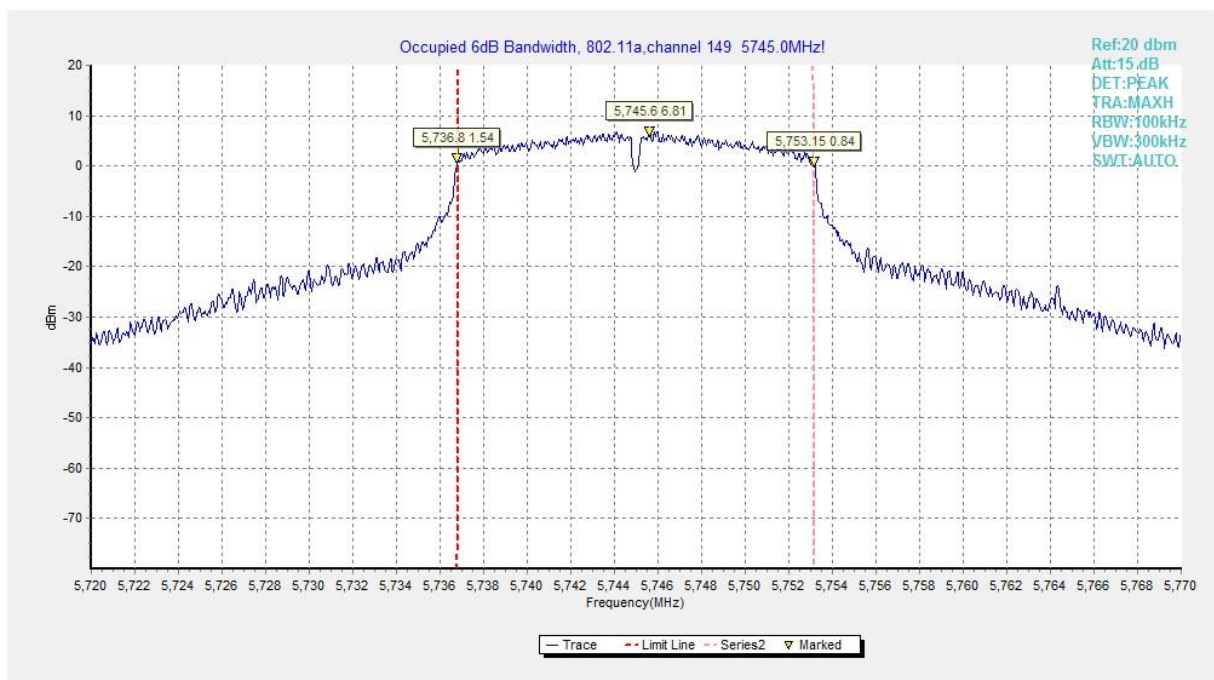
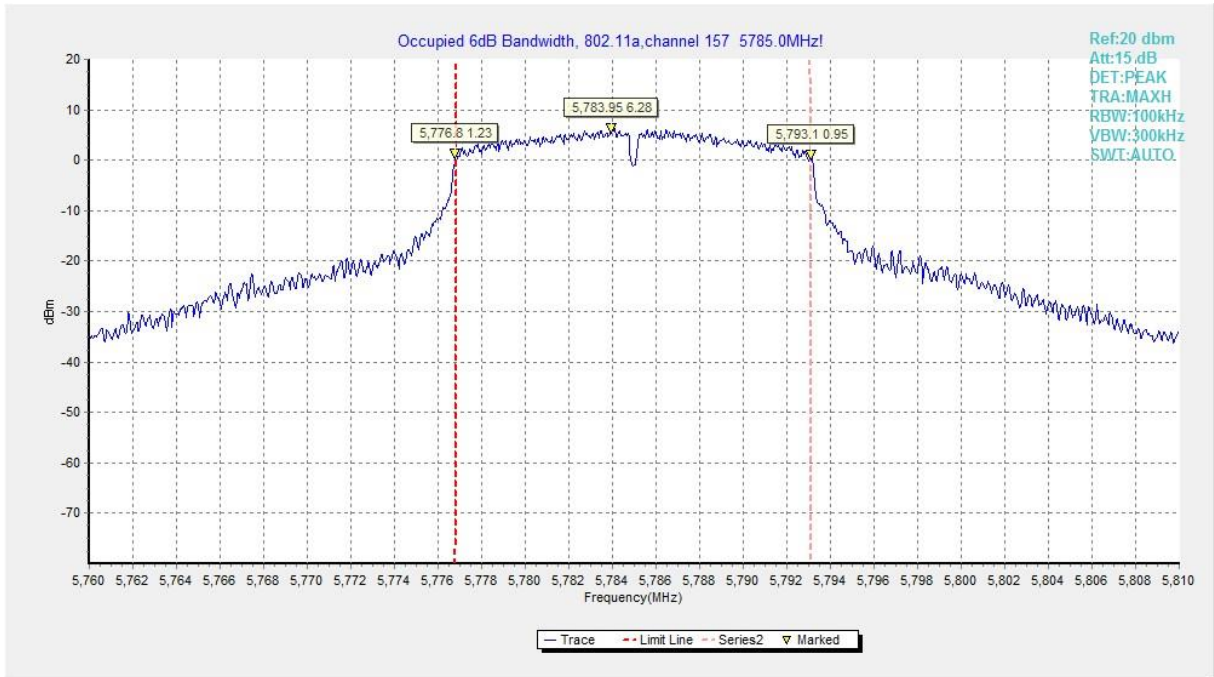
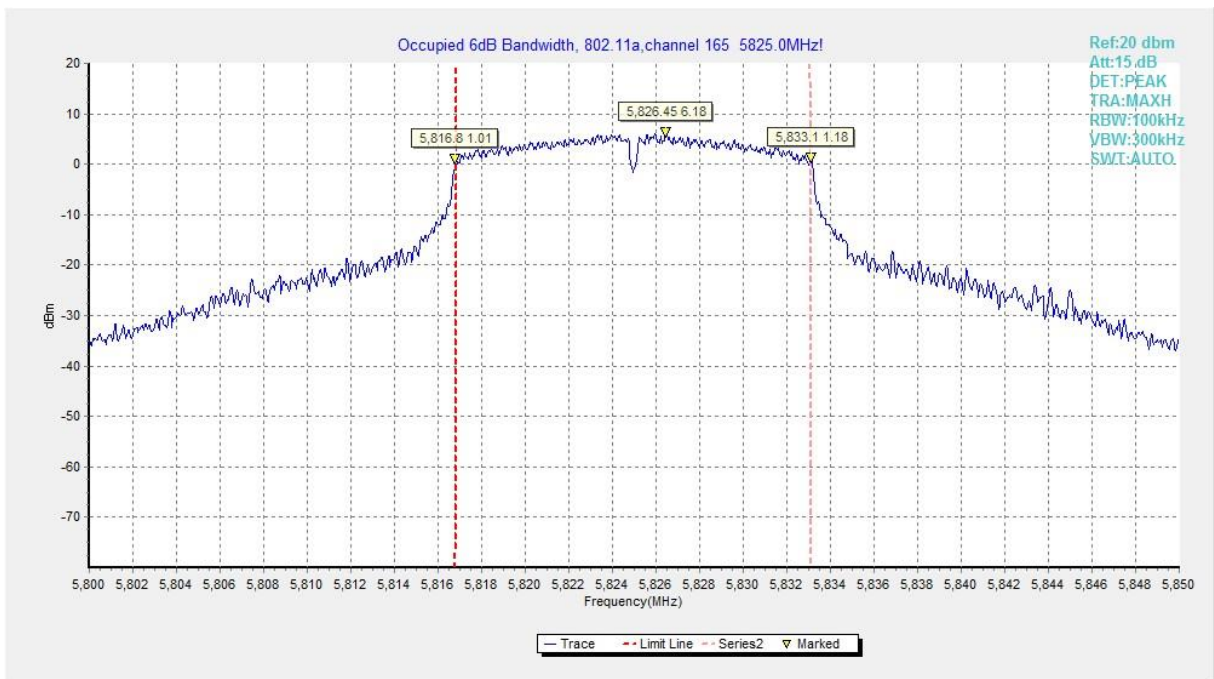


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)



**Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)**



**Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)**



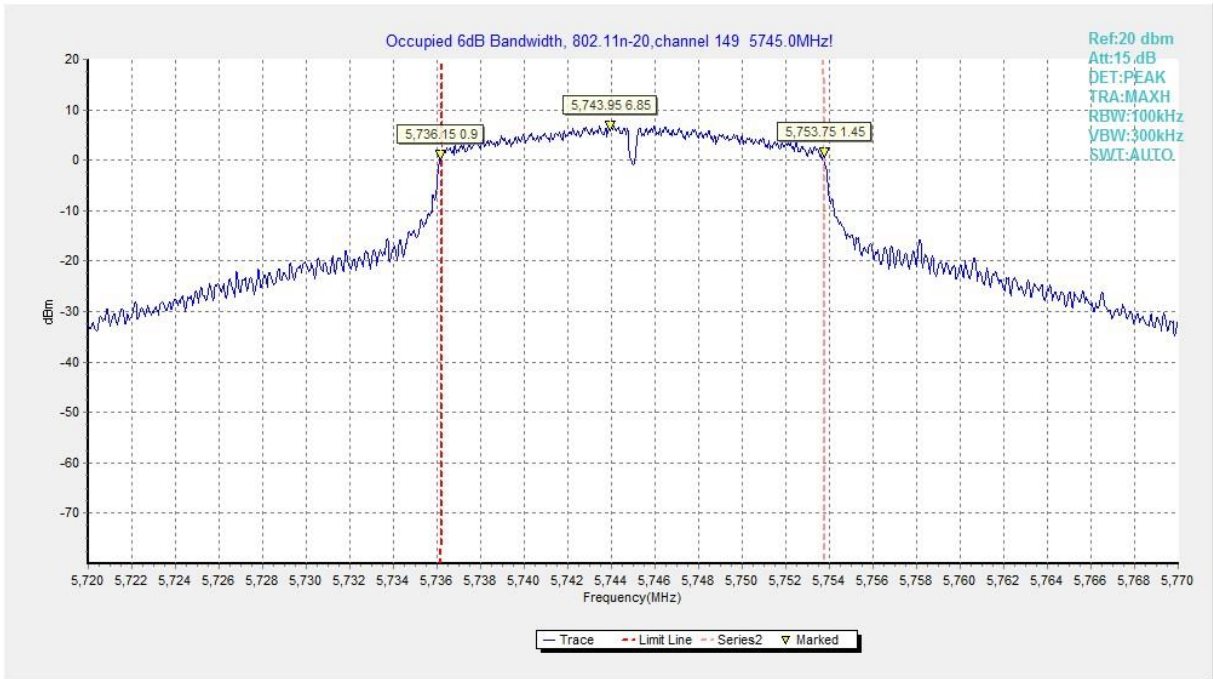


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

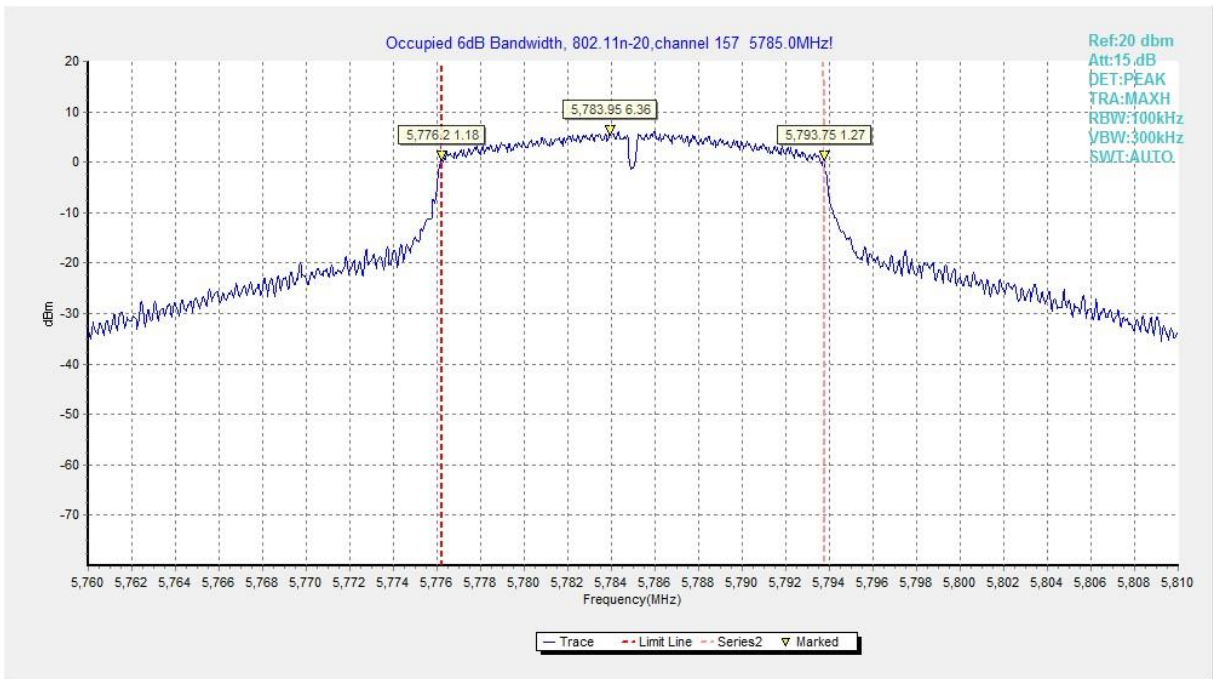
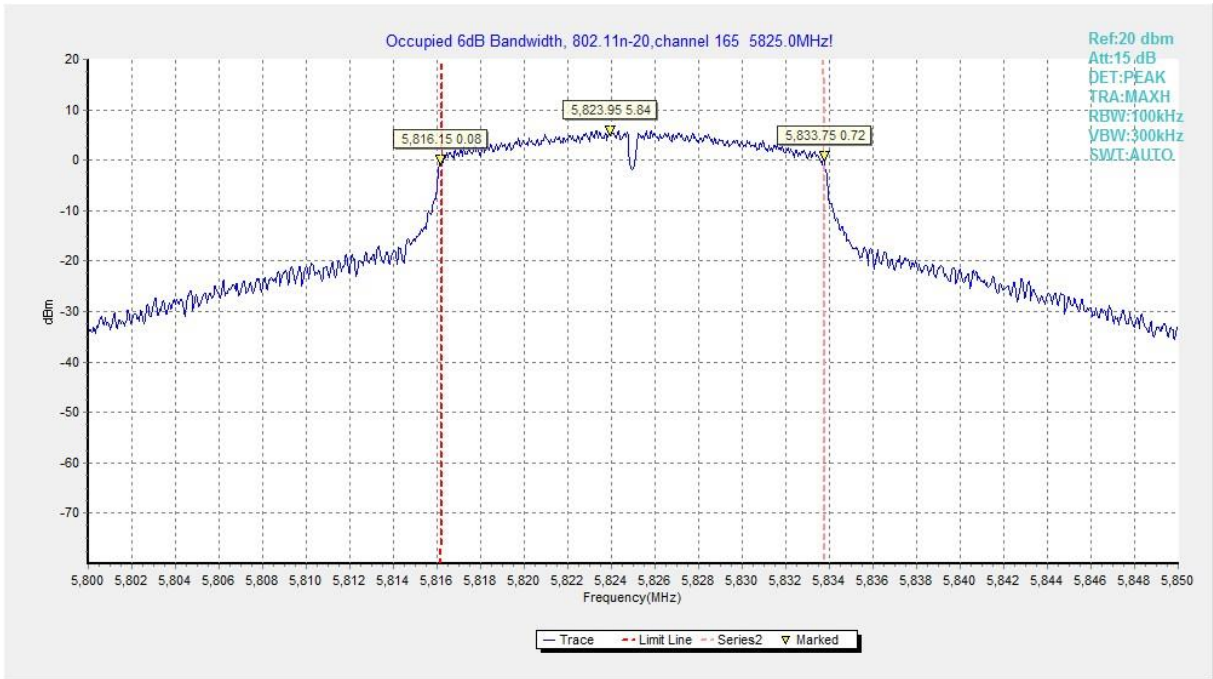
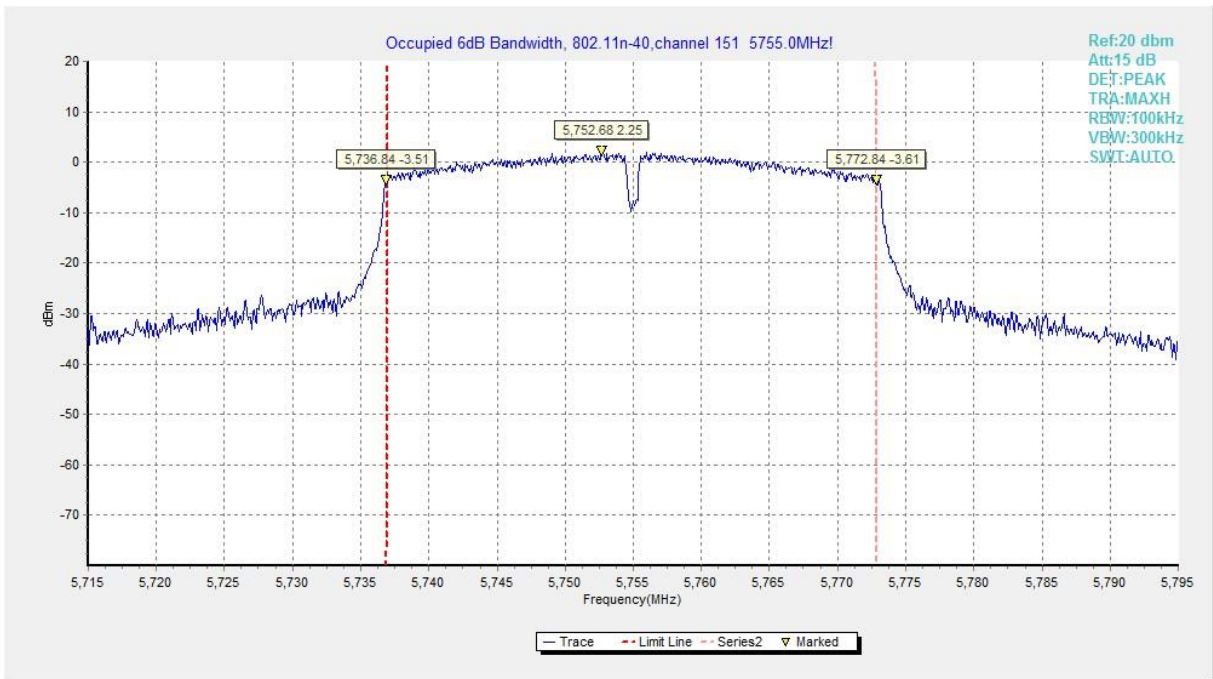


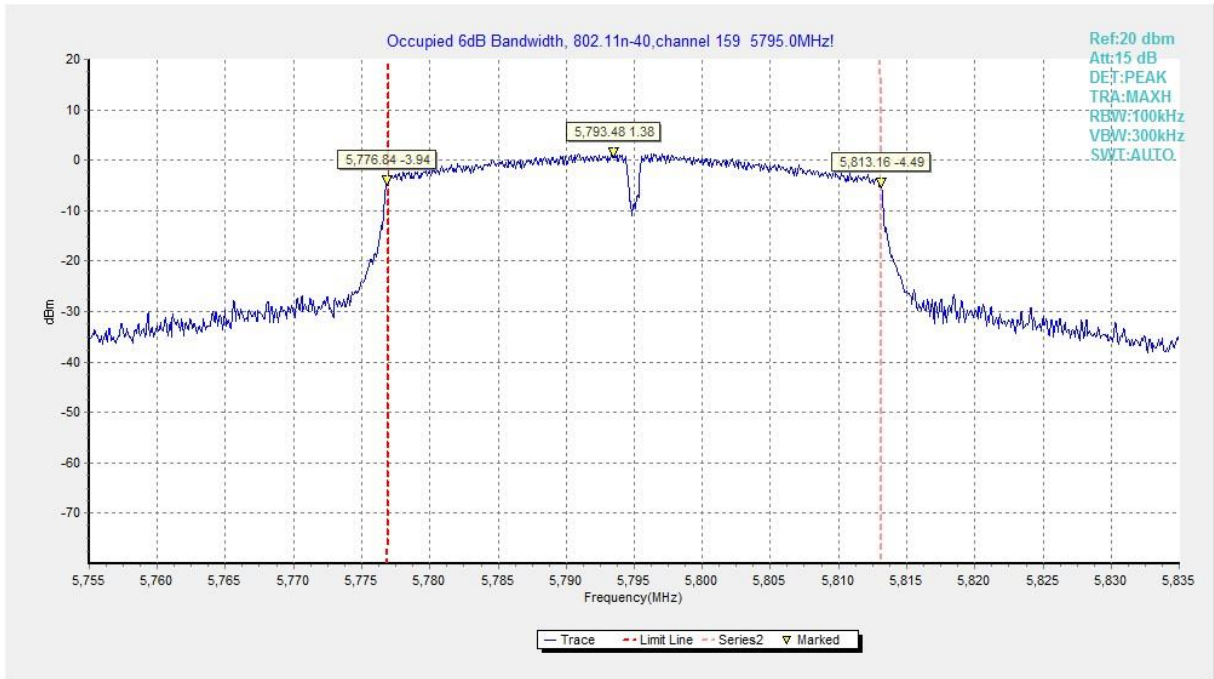
Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)



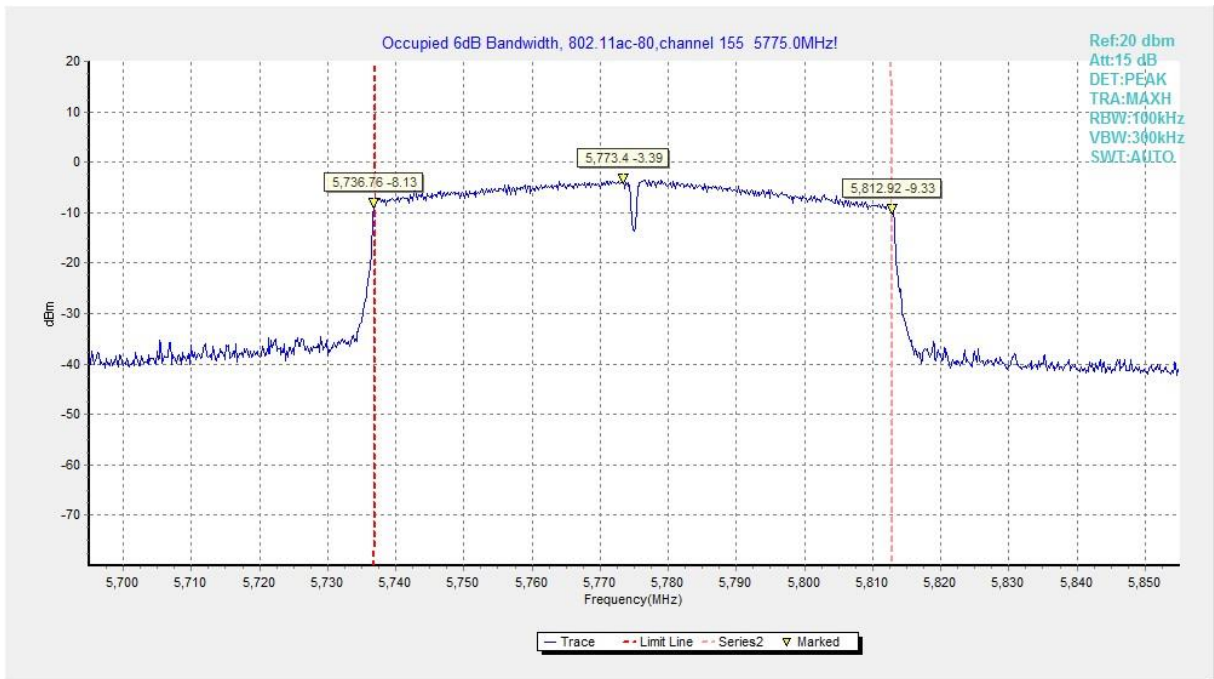
**Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)**



**Fig. 7 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)**



**Fig. 8 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)**



**Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)**

## A.5. Transmitter Spurious Emission

### A.5.1 Transmitter Spurious Emission - Radiated

#### Measurement Limit:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: Increasing linearly from point to point.	

The measurement is made according to KDB 789033

#### Measurement Results:

##### 802.11a mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
	165	26.5 GHz~ 40 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

##### 802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
	165	26.5 GHz~ 40 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11n-HT40 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	151	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P
	159	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT20 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT20)	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P
	165	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT40 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT40)	151	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P
	159	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT80 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT80)	155	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P

		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P

**Conclusion: PASS**

**Note:**

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

$P_{Mea}$  is the field strength recorded from the instrument.

**Average Results:**

**802.11a**

Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17793.200	41.99	-25.50	46.66	20.83	54.00	12.01	V
17954.300	41.79	-25.50	46.66	20.63	54.00	12.21	V
16055.200	38.28	-27.35	38.54	27.09	54.00	15.72	V
16063.500	38.20	-26.77	38.93	26.04	54.00	15.80	V
11050.200	36.24	-32.49	38.72	30.00	54.00	17.76	V
11046.400	36.23	-32.49	38.72	29.99	54.00	17.77	V

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17940.600	41.99	-25.50	46.66	20.83	54.00	12.01	H
17976.900	41.83	-25.50	46.66	20.67	54.00	12.17	V
16147.000	38.15	-26.77	38.93	25.99	54.00	15.85	V
13338.800	38.12	-29.49	39.71	27.90	54.00	15.88	V
11949.500	36.44	-31.48	39.09	28.83	54.00	17.56	H
11933.500	36.27	-31.48	39.09	28.66	54.00	17.73	V

Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17941.700	41.76	-25.50	46.66	20.60	54.00	12.24	H
17998.900	41.69	-25.50	46.66	20.53	54.00	12.31	V
16055.800	38.26	-27.35	38.54	27.07	54.00	15.74	V
16054.600	38.08	-27.35	38.54	26.89	54.00	15.92	V
11938.500	36.26	-31.48	39.09	28.65	54.00	17.74	H
11998.400	36.23	-31.48	39.09	28.62	54.00	17.77	H

**802.11n-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17775.600	42.04	-25.50	46.66	20.88	54.00	11.96	V
17782.800	41.90	-25.50	46.66	20.74	54.00	12.10	H
16064.000	38.19	-26.77	38.93	26.03	54.00	15.81	V
16153.100	38.01	-26.77	38.93	25.85	54.00	15.99	H
11938.500	36.26	-31.48	39.09	28.65	54.00	17.74	H
11921.400	36.20	-31.48	39.09	28.59	54.00	17.80	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17995.600	41.85	-25.50	46.66	20.69	54.00	12.15	V
17767.300	41.79	-25.50	46.66	20.63	54.00	12.21	V
16082.700	38.28	-26.77	38.93	26.12	54.00	15.72	V
13332.700	38.26	-29.49	39.71	28.04	54.00	15.74	V
11910.400	36.25	-31.85	39.05	29.05	54.00	17.75	H
11527.600	36.12	-32.26	38.84	29.55	54.00	17.88	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17990.100	42.04	-25.50	46.66	20.88	54.00	11.96	H
17868.500	41.77	-25.50	46.66	20.61	54.00	12.23	V
16071.700	38.14	-26.77	38.93	25.98	54.00	15.86	H
16071.100	38.13	-26.77	38.93	25.97	54.00	15.87	V
11925.800	36.48	-31.48	39.09	28.87	54.00	17.52	H
11538.600	36.31	-32.26	38.84	29.74	54.00	17.69	H

**802.11n-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17922.500	41.79	-25.50	46.66	20.63	54.00	12.21	V
17762.400	41.78	-25.50	46.66	20.62	54.00	12.22	V
16140.500	38.19	-26.77	38.93	26.03	54.00	15.81	H
15980.400	38.15	-27.35	38.54	26.96	54.00	15.85	V
11964.300	36.20	-31.48	39.09	28.59	54.00	17.80	V
11533.600	36.14	-32.26	38.84	29.57	54.00	17.86	H

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17720.600	41.82	-25.74	45.95	21.61	54.00	12.18	V
17734.900	41.70	-25.74	45.95	21.49	54.00	12.30	H
16075.000	38.47	-26.77	38.93	26.31	54.00	15.53	H
16055.800	38.26	-27.35	38.54	27.07	54.00	15.74	V
11918.600	36.35	-31.48	39.09	28.74	54.00	17.65	V
11923.000	36.33	-31.48	39.09	28.72	54.00	17.67	V



**802.11ac-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17744.200	41.94	-25.50	46.66	20.78	54.00	12.06	V
17941.700	41.84	-25.50	46.66	20.68	54.00	12.16	H
16049.700	38.54	-27.35	38.54	27.35	54.00	15.46	V
16062.900	38.15	-26.77	38.93	25.99	54.00	15.85	H
11941.200	36.25	-31.48	39.09	28.64	54.00	17.75	V
11935.100	36.24	-31.48	39.09	28.63	54.00	17.76	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17769.500	41.63	-25.50	46.66	20.47	54.00	12.37	H
17945.000	41.59	-25.50	46.66	20.43	54.00	12.41	V
16054.100	38.19	-27.35	38.54	27.00	54.00	15.81	V
16069.000	38.13	-26.77	38.93	25.97	54.00	15.87	H
11050.200	36.33	-32.49	38.72	30.09	54.00	17.67	V
11943.400	36.33	-31.48	39.09	28.72	54.00	17.67	V

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17965.900	41.86	-25.50	46.66	20.70	54.00	12.14	V
17950.500	41.84	-25.50	46.66	20.68	54.00	12.16	H
15970.500	38.24	-27.35	38.54	27.05	54.00	15.76	H
16045.900	38.16	-27.35	38.54	26.97	54.00	15.84	V
11939.000	36.47	-31.48	39.09	28.86	54.00	17.53	V
11944.000	36.41	-31.48	39.09	28.80	54.00	17.59	H

**802.11ac-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.300	41.91	-25.50	46.66	20.75	54.00	12.09	H
17941.200	41.75	-25.50	46.66	20.59	54.00	12.25	V
16062.400	38.09	-26.77	38.93	25.93	54.00	15.91	V
16058.500	38.06	-26.77	38.93	25.90	54.00	15.94	H
11936.200	36.40	-31.48	39.09	28.79	54.00	17.60	H
11922.000	36.26	-31.48	39.09	28.65	54.00	17.74	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17778.900	41.90	-25.50	46.66	20.74	54.00	12.10	V
17989.500	41.69	-25.50	46.66	20.53	54.00	12.31	V
16151.500	38.14	-26.77	38.93	25.98	54.00	15.86	H
14497.000	38.11	-28.59	42.46	24.24	54.00	15.89	V
11957.700	36.29	-31.48	39.09	28.68	54.00	17.71	V
11539.100	36.23	-32.26	38.84	29.66	54.00	17.77	V

**802.11ac-HT80**

## Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17754.200	41.99	-25.50	46.66	20.83	54.00	12.01	H
17994.000	41.82	-25.50	46.66	20.66	54.00	12.18	V
16147.600	38.19	-26.77	38.93	26.03	54.00	15.81	H
16059.600	38.18	-26.77	38.93	26.02	54.00	15.82	V
11942.900	36.43	-31.48	39.09	28.82	54.00	17.57	V
11530.400	36.27	-32.26	38.84	29.70	54.00	17.73	V

**Peak Results:**
**802.11a**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17755.200	53.12	-25.50	46.66	31.96	74.00	20.88	H
17939.500	52.89	-25.50	46.66	31.73	74.00	21.11	H
13656.100	50.85	-29.50	40.43	39.92	68.30	17.45	H
16609.000	50.62	-26.87	40.65	36.84	68.30	17.68	V
10870.900	46.70	-32.33	38.59	40.44	74.00	27.30	V
9188.500	46.61	-33.85	38.08	42.38	74.00	27.39	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
16561.800	52.94	-26.87	40.65	39.16	68.30	15.36	V
17620.000	52.31	-25.74	45.95	32.10	68.30	15.99	H
17997.800	52.24	-25.50	46.66	31.08	74.00	21.76	H
16870.800	51.02	-26.62	41.49	36.15	68.30	17.28	V
10676.800	47.56	-32.76	38.38	41.94	74.00	26.44	H
11935.700	47.17	-31.48	39.09	39.56	74.00	26.83	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17311.400	52.18	-25.95	44.35	33.77	68.30	16.12	V
17983.500	52.09	-25.50	46.66	30.93	74.00	21.91	H
16638.200	50.75	-26.87	40.65	36.97	68.30	17.55	H
16856.000	50.46	-26.62	41.49	35.59	68.30	17.84	H
11862.000	47.17	-31.85	39.05	39.97	74.00	26.83	V
11433.000	46.81	-32.42	38.79	40.44	74.00	27.19	H

**802.11n-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17985.200	53.06	-25.50	46.66	31.90	74.00	20.94	V
17816.300	52.88	-25.50	46.66	31.72	74.00	21.12	H
13582.400	51.04	-29.50	40.43	40.11	68.30	17.26	H
16704.800	50.55	-26.87	40.65	36.77	68.30	17.75	V
11999.000	46.79	-31.48	39.09	39.18	74.00	27.21	V
11935.700	46.78	-31.48	39.09	39.17	74.00	27.22	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17784.400	52.32	-25.50	46.66	31.16	74.00	21.68	V
17985.200	52.31	-25.50	46.66	31.15	74.00	21.69	H
16586.000	52.23	-26.87	40.65	38.45	68.30	16.07	V
13739.700	50.97	-29.10	40.86	39.20	68.30	17.33	H
11917.500	46.66	-31.48	39.09	39.05	74.00	27.34	V
11918.100	46.63	-31.48	39.09	39.02	74.00	27.37	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17588.000	53.59	-25.74	45.95	33.38	68.30	14.71	V
17711.200	52.79	-25.74	45.95	32.58	74.00	21.21	H
16571.100	50.54	-26.87	40.65	36.76	68.30	17.76	V
16982.000	50.48	-26.32	42.36	34.43	68.30	17.82	H
10008.000	47.12	-33.63	38.11	42.64	68.30	21.18	V
11860.900	47.10	-31.85	39.05	39.90	74.00	26.90	H

**802.11n-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17305.300	52.29	-25.95	44.35	33.88	68.30	16.01	V
17723.900	52.25	-25.74	45.95	32.04	74.00	21.75	V
13765.000	50.49	-29.10	40.86	38.72	68.30	17.81	H
16961.600	50.38	-26.32	42.36	34.33	68.30	17.92	H
11891.700	47.14	-31.85	39.05	39.94	74.00	26.86	H
11557.900	47.05	-32.26	38.84	40.48	74.00	26.95	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17791.500	52.42	-25.50	46.66	31.26	74.00	21.58	V
17299.800	52.32	-25.95	44.35	33.91	68.30	15.98	H
16853.800	50.69	-26.62	41.49	35.82	68.30	17.61	V
13661.000	50.56	-29.50	40.43	39.63	68.30	17.74	H
11207.000	47.18	-32.60	38.75	41.04	74.00	26.82	H
11536.400	47.06	-32.26	38.84	40.49	74.00	26.94	H

**802.11ac-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17971.400	52.28	-25.50	46.66	31.12	74.00	21.72	H
17706.800	51.97	-25.74	45.95	31.76	74.00	22.03	H
16772.400	50.72	-26.62	41.49	35.85	68.30	17.58	H
16997.300	50.65	-26.32	42.36	34.60	68.30	17.65	V
11880.100	47.41	-31.85	39.05	40.21	74.00	26.59	V
11940.100	47.13	-31.48	39.09	39.52	74.00	26.87	V

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17715.700	52.40	-25.74	45.95	32.19	74.00	21.60	H
17727.200	52.20	-25.74	45.95	31.99	74.00	21.80	H
16586.500	50.79	-26.87	40.65	37.01	68.30	17.51	H
16549.700	50.60	-26.87	40.65	36.82	68.30	17.70	V
8706.100	46.64	-34.42	38.00	43.05	68.30	21.66	H
11047.500	46.62	-32.49	38.72	40.38	74.00	27.38	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17782.800	52.14	-25.50	46.66	30.98	74.00	21.86	V
17601.800	52.05	-25.74	45.95	31.84	68.30	16.25	H
16776.200	50.28	-26.62	41.49	35.41	68.30	18.02	H
16809.800	50.25	-26.62	41.49	35.38	68.30	18.05	H
11926.900	46.98	-31.48	39.09	39.37	74.00	27.02	H
11069.500	46.86	-32.49	38.72	40.62	74.00	27.14	V

**802.11ac-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17759.100	52.67	-25.50	46.66	31.51	74.00	21.33	H
17980.200	52.55	-25.50	46.66	31.39	74.00	21.45	H
16554.600	50.58	-26.87	40.65	36.80	68.30	17.72	V
16870.800	50.39	-26.62	41.49	35.52	68.30	17.91	H
11850.500	47.76	-31.85	39.05	40.56	74.00	26.24	V
11535.300	47.04	-32.26	38.84	40.47	74.00	26.96	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17974.200	52.67	-25.50	46.66	31.51	74.00	21.33	V
17928.500	52.62	-25.50	46.66	31.46	74.00	21.38	V
16627.200	50.93	-26.87	40.65	37.15	68.30	17.37	H
16872.500	50.67	-26.62	41.49	35.80	68.30	17.63	V
11952.200	47.10	-31.48	39.09	39.49	74.00	26.90	H
11989.600	46.74	-31.48	39.09	39.13	74.00	27.26	V

**802.11ac-HT80**

## Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17972.500	52.61	-25.50	46.66	31.45	74.00	21.39	V
17800.900	52.37	-25.50	46.66	31.21	74.00	21.63	V
16579.900	50.81	-26.87	40.65	37.03	68.30	17.49	H
16749.800	50.79	-26.62	41.49	35.92	68.30	17.51	V
11035.400	47.06	-32.49	38.72	40.82	74.00	26.94	V
11044.100	46.79	-32.49	38.72	40.55	74.00	27.21	V

## A.6. Band Edges Compliance

### A6.1 Band Edges - Radiated

#### Measurement Limit:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: increasing linearly from point to point.	

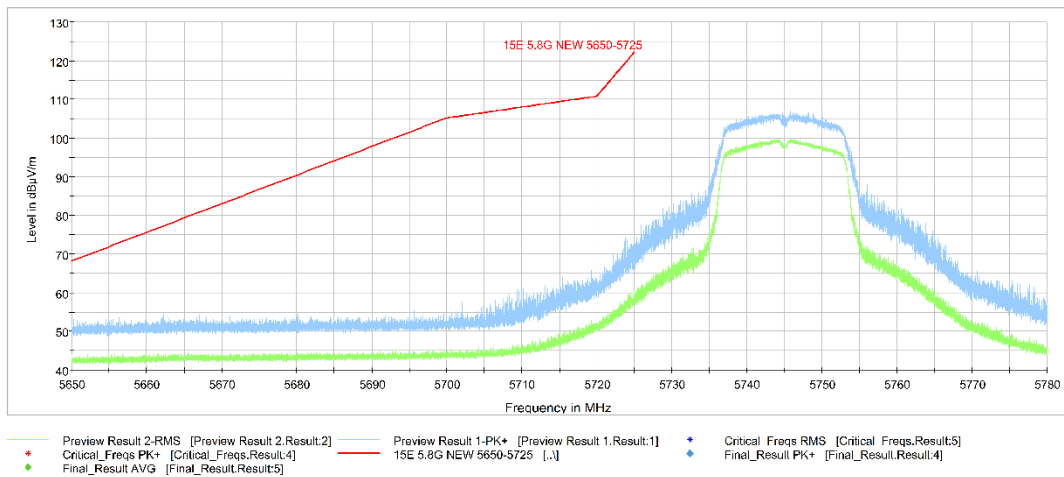
#### Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.10	P
	5825 MHz	Fig.11	P
802.11n HT20	5745 MHz	Fig.12	P
	5825 MHz	Fig.13	P
802.11n HT40	5755 MHz	Fig.14	P
	5795 MHz	Fig.15	P
802.11ac HT20	5745 MHz	Fig.16	P
	5825 MHz	Fig.17	P
802.11ac HT40	5755 MHz	Fig.18	P
	5795 MHz	Fig.19	P
802.11ac HT80	5775 MHz	Fig.20 Fig.21	P

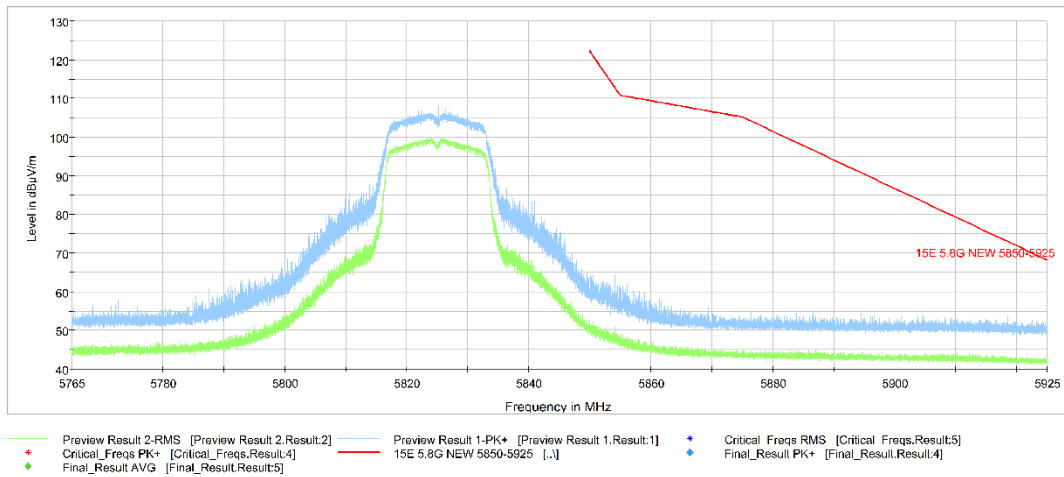
**Conclusion: PASS**

Test graphs as below:

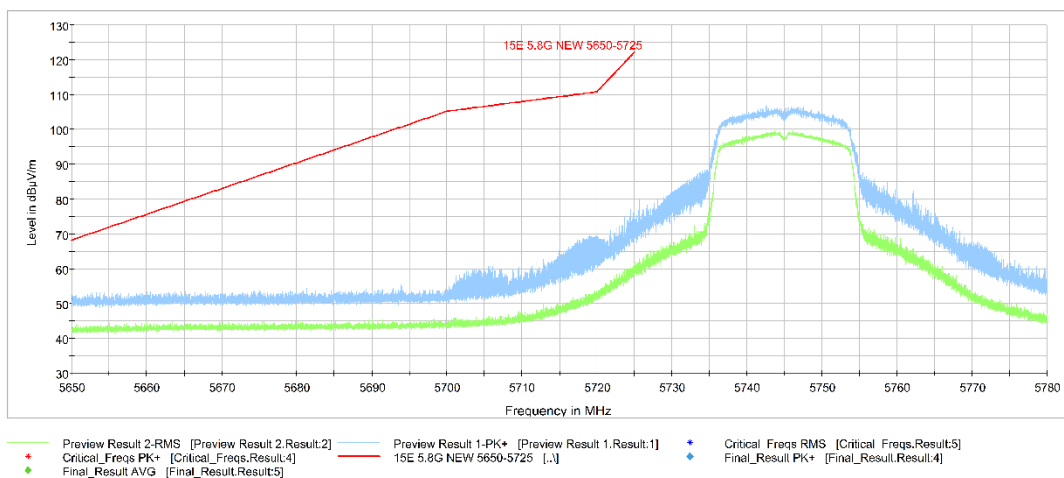




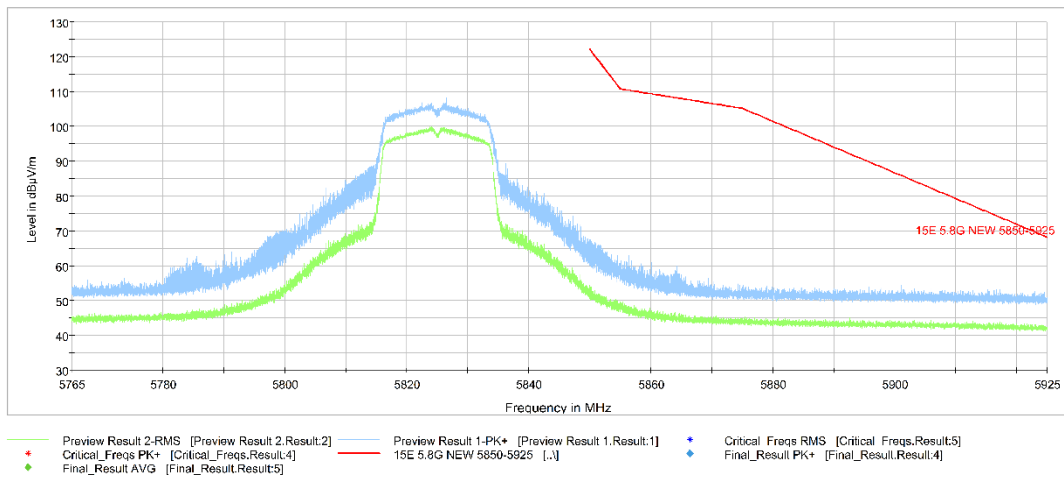
**Fig. 10 Band Edges (802.11a Ch149, 5745MHz)**



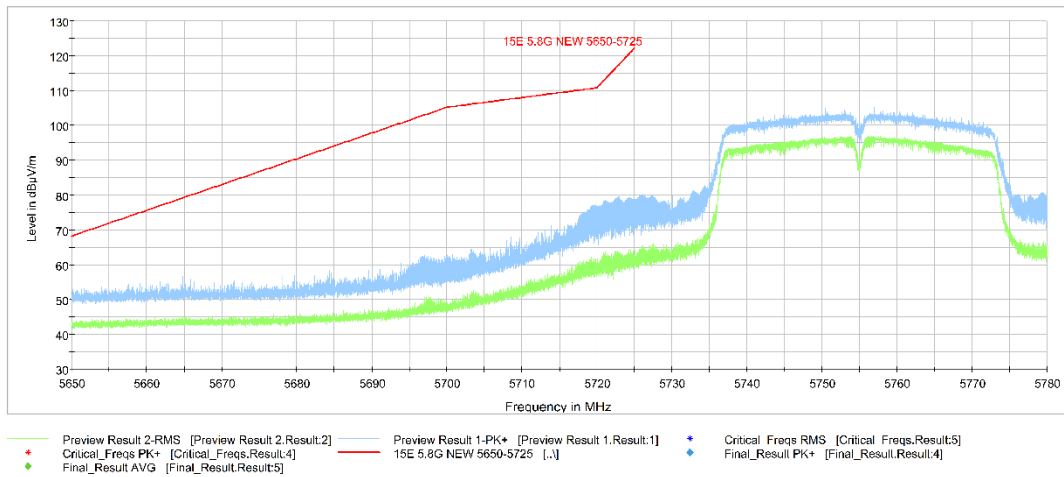
**Fig. 11 Band Edges (802.11a Ch165, 5825MHz)**



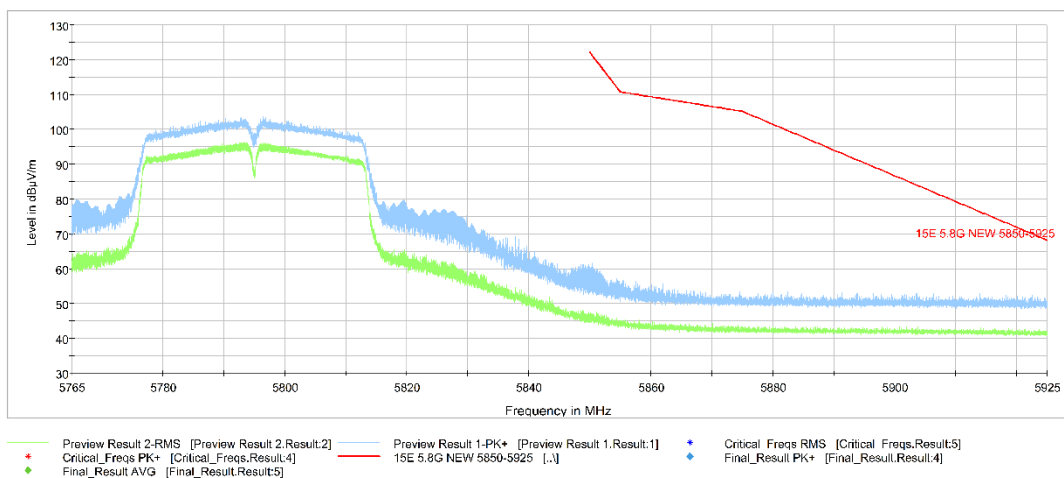
**Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)**



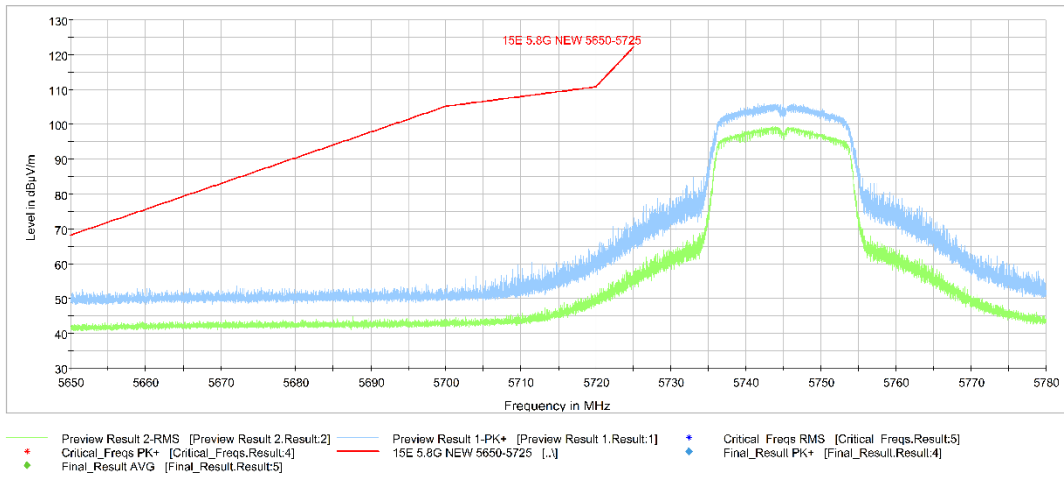
**Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)**



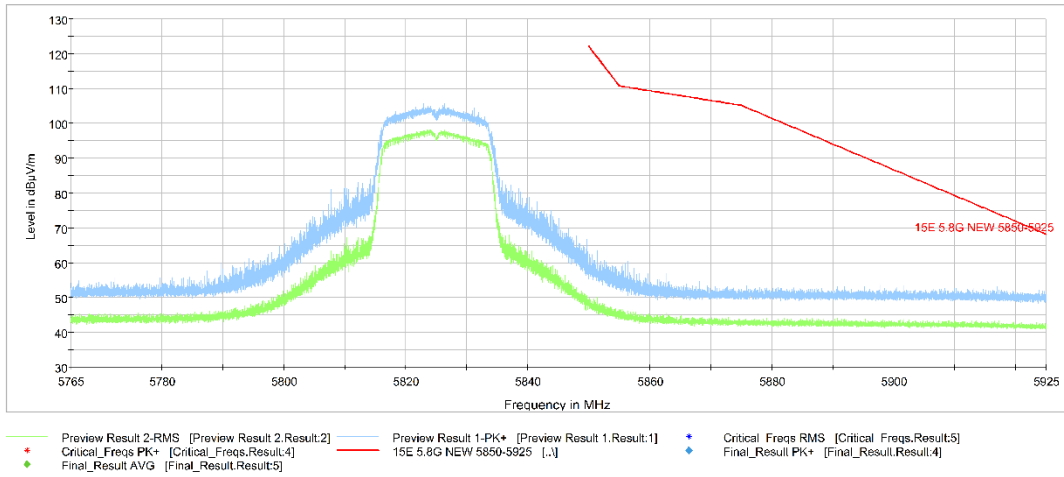
**Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)**



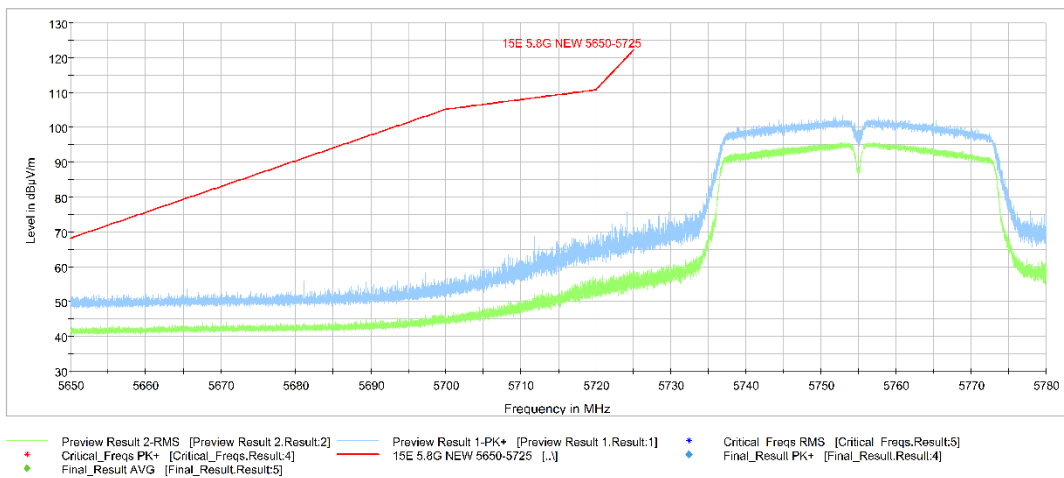
**Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)**



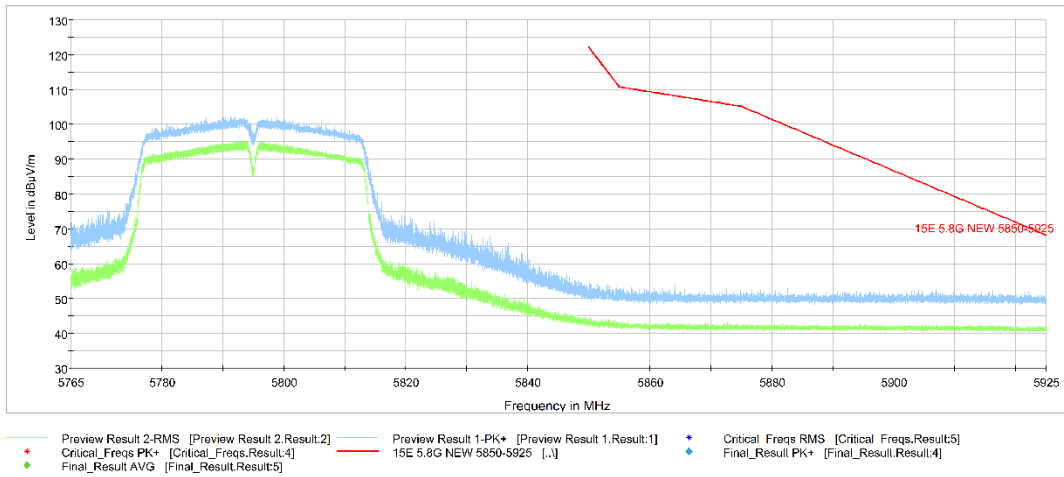
**Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)**



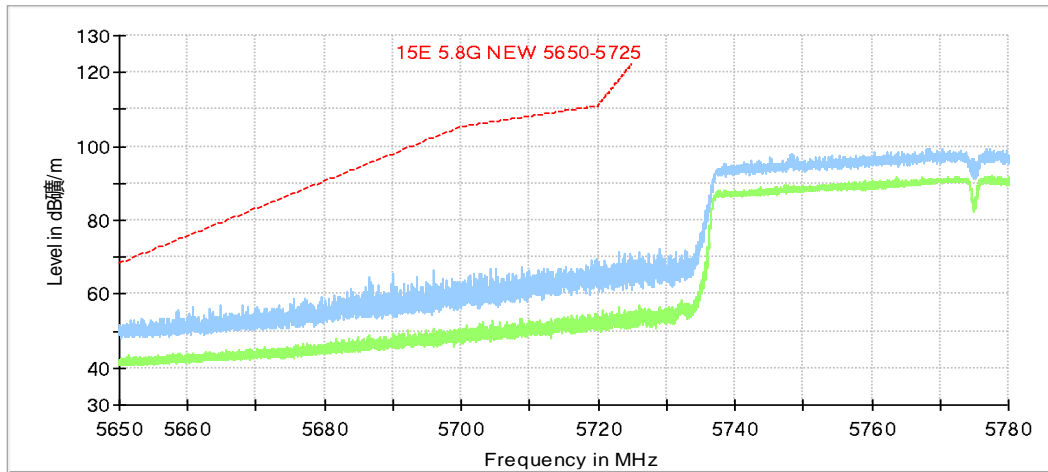
**Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)**



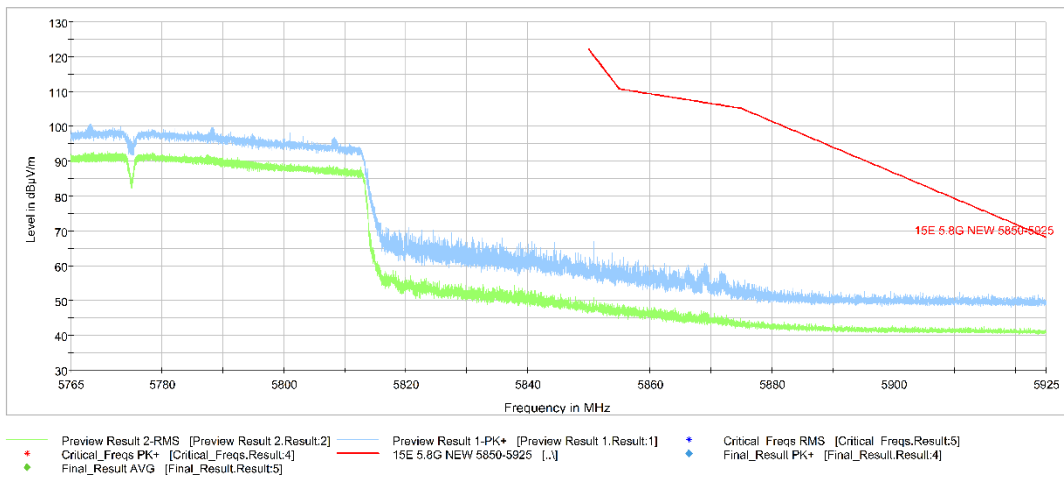
**Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)**



**Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)**



**Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)**



**Fig. 21 Band Edges (802.11ac-HT80, 5775MHz)**

## A.7. AC Powerline Conducted Emission

### Test Condition:

Voltage (V)	Frequency (Hz)
120	60

### Measurement uncertainty:

Expanded measurement uncertainty for this test item is  $U = 3.08\text{dB}$ ,  $k=2$ .

### Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.22	Fig.23	P
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.22	Fig.23	P
0.5 to 5	46			
5 to 30	50			

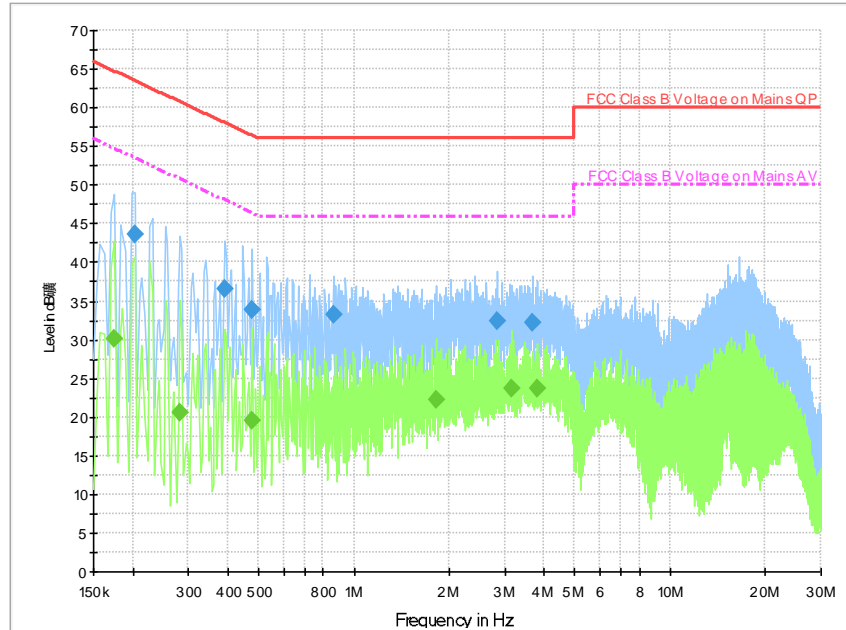
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10 .

**Conclusion: PASS**

**Test graphs as below:**

**Traffic:**



**Fig. 22 AC Power line Conducted Emission-802.11a**

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

**Final Result 1**

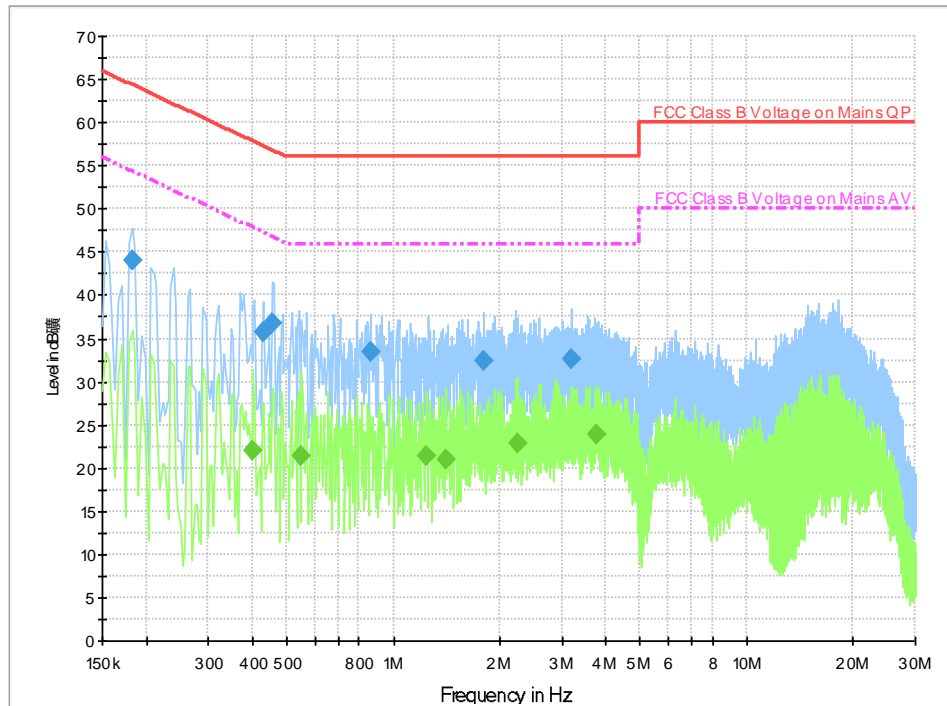
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.202000	43.6	5000.	9.000	On	L1	20.0	19.9	63.5	
0.390000	36.6	5000.	9.000	On	N	19.9	21.5	58.1	
0.478000	33.9	5000.	9.000	On	L1	19.9	22.5	56.4	
0.862000	33.2	5000.	9.000	On	N	19.8	22.8	56.0	
2.850000	32.5	5000.	9.000	On	N	19.7	23.5	56.0	
3.658000	32.2	5000.	9.000	On	N	19.7	23.8	56.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.174000	30.2	5000.	9.000	On	L1	20.0	24.5	54.8	
0.282000	20.5	5000.	9.000	On	N	19.9	30.2	50.8	
0.474000	19.6	5000.	9.000	On	N	20.0	26.8	46.4	
1.822000	22.2	5000.	9.000	On	N	19.8	23.8	46.0	
3.142000	23.6	5000.	9.000	On	N	19.7	22.4	46.0	
3.790000	23.8	5000.	9.000	On	N	19.7	22.2	46.0	

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers

Idle:



**Fig. 23 AC Power line Conducted Emission-Idle**

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.182000	44.1	5000.	9.000	On	L1	20.0	20.3	64.4	
0.430000	35.7	5000.	9.000	On	N	19.9	21.6	57.3	
0.454000	36.7	5000.	9.000	On	L1	19.9	20.1	56.8	
0.862000	33.3	5000.	9.000	On	N	19.8	22.7	56.0	
1.810000	32.5	5000.	9.000	On	N	19.8	23.5	56.0	
3.178000	32.5	5000.	9.000	On	N	19.7	23.5	56.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.402000	22.1	5000.0	9.000	On	L1	19.9	25.7	47.8	
0.550000	21.5	5000.0	9.000	On	L1	19.9	24.5	46.0	
1.246000	21.4	5000.0	9.000	On	N	19.8	24.6	46.0	
1.414000	21.1	5000.0	9.000	On	N	19.8	24.9	46.0	
2.242000	22.9	5000.0	9.000	On	N	19.7	23.1	46.0	
3.778000	23.8	5000.0	9.000	On	N	19.7	22.2	46.0	

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers

## ANNEX B: EUT parameters

Disclaimer: The antenna gain and worse case provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

## ANNEX C: Accreditation Certificate



\*\*\* END OF REPORT BODY \*\*\*